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Appl. No. 10/796,645
Reply to Office Action of June 15, 2006

Attorney Docket No. 26114.13
Customer No. 27683

REMARKS

Claim 5 has been amended, and Claim 6 has been canceled. Claims 1-5 and 7-31 are pending in the application. In view of the foregoing amendments, and the remarks that follow, Applicants respectfully request reconsideration.

Comment Regarding Power of Attorney

The Power of Attorney for this application does not happen to identify the undersigned attorney. Consequently, in filing this Amendment, the undersigned is acting under the provisions of 37 C.F.R. §1.34.

Request

If, after considering the foregoing arguments, the Examiner is still of the opinion that the claims are not all allowable, then Applicants respectfully request that the Examiner telephone the undersigned in order to schedule a telephone interview (involving both Examiner Quash and the primary examiner). In addition to the undersigned, Applicants have a technical expert who would be involved in the telephone interview, and who should be able to help clarify for the Examiner why the claimed subject matter is not actually taught by the art that is currently being applied against the claims.

Second Paragraph of 35 U.S.C. §112

The Office Action objected to Claims 5-6 as indefinite under the second paragraph of 35 U.S.C. §112, on the ground that there was insufficient antecedent basis in Claim 5 for a reference to "the electro-magnet". Claim 5 has been amended to replace "electro-magnet" with "superconducting magnet", which has a proper antecedent basis in independent Claim 1. Claim 5 should thus now be in compliance with §112, and notice to that effect is respectfully requested. Claim 6 has been canceled.

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Independent Claim 1

Independent Claim 1 stands rejected under 35 U.S.C. §103 on the ground that it would be obvious in view of an article by Naito entitled "Improvement in the electric field in the cylindrical trapped-ion cell". This ground of rejection is respectfully traversed. The PTO specifies in MPEP §2142 that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Naito fails to establish a *prima facie* case of obviousness under §103 with respect to Claim 1, for mutually exclusive reasons that are discussed below.

NAITO FAILS TO TEACH ALL OF THE CLAIM LIMITATIONS

MPEP §2142 specifies with respect to §103 that:

To establish a *prima facie* case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations. (Emphasis added).

The PTO considers this requirement to be important, as evidenced by the fact that this exact language appears not only in MPEP §2142, but also in other sections of the MPEP, including MPEP §706.02(j) and MPEP §2143. Applicants' Claim 1 includes a recitation of:

an FT-ICR measurement cell arranged within the bore of
the superconducting magnet, the cell having cell walls within

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which is defined a cell volume for receiving ions from an external ion source, the cell extending in the direction of the longitudinal axis of the superconducting magnet and being generally coaxial therewith;

wherein the ratio, R , of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the said longitudinal axis, is less than 4.25.

Naito discloses a Fourier transform ion cyclotron resonance (FT-ICR) mass spectrometer. The Examiner asserts that the measurement cell of Naito has a cell volume for receiving ions from an external ion source. However, Naito uses an internal ion source (as evidenced by Figure 3), and does not teach or suggest the use of an external ion source. Naito thus fails to satisfy the requirement of MPEP §2142 that Naito must "teach or suggest all the claim limitations" (emphasis added). Therefore, for this independent reason alone, it is respectfully submitted that Claim 1 is not obvious under §103 in view of Naito, and notice to that effect is respectfully requested.

IT WOULD NOT BE OBVIOUS TO MODIFY NAITO

The Office Action does not recognize and address the fact that, in order for Naito to meet the subject matter of Claim 1, it would be necessary to modify Naito's system by replacing Naito's internal ion source with an external ion source. Applicants respectfully submit that this change would not be an obvious modification. An external ion source involves different constraints on the dimensions of a measurement cell, for example due to different pressure requirements. Consequently, a person of ordinary skill in the art would not consider it obvious to remove the internal ion source of Naito, as this would necessarily lead to a redesign of the

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measurement cell configuration; and redesign involves more than just an obvious expedient. Therefore, for this independent reason alone, it is respectfully submitted that Claim 1 is not obvious under §103 in view of Naito, and notice to that effect is respectfully requested.

THE PRIOR ART PROVIDES NO MOTIVATION TO MODIFY NAITO

There is yet another reason why the proposed modification of Naito is not proper under §103. MPEP §2142 provides that:

To establish a *prima facie* case of obviousness, . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference The teaching or suggestion to make the claimed combination . . . must . . . be found in the prior art, and not based on applicant's disclosure.

As mentioned earlier, the Office Action does not recognize that the internal ion source of Naito would have to be replaced with an external ion source in order to meet the subject matter of Claim 1. Consequently, the Office Action offers no theory as to why a person skilled in the art would be motivated to make this modification. Thus, the Office Action necessarily fails to meet the requirements set forth in MPEP §2142 for establishing a *prima facie* case of obviousness. Moreover, Applicants respectfully submit that the prior art does not provide any such motivation. Naito specifically teaches use of an internal ion source, and Naito does not appear to contain anything that would motivate a person of ordinary skill in the art to take a different approach and use an external ion source (especially in view of the level of redesign that would be needed in Naito in order to replace Naito's internal ion source with an external ion source). Therefore, since the prior art does not appear to provide any motivation to make this modification to Naito, the only apparent source for the idea of switching to an external ion source would appear to be

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hindsight of the present invention (rather than motivation properly derived from what was known prior to the present invention).

In regard to hindsight, examiners frequently attempt to justify the use of hindsight by turning to PTO Form Paragraph 7.37.03, which states that "any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning". However, even this form paragraph goes on to emphasize that hindsight is permissible only to the extent that it "does not include knowledge gleaned only from the applicant's disclosure" (emphasis added). Here, Naito cannot possibly render the subject matter of Claim 1 obvious, unless the analysis also includes hindsight of Applicants' disclosure. But MPEP §2142 and Form Paragraph 7.37.03 both make it very clear that hindsight of Applicants' disclosure cannot be used under §103. Accordingly, for this independent reason alone, it is respectfully submitted that Claim 1 is not rendered obvious under §103 by Naito, and notice to that effect is respectfully requested.

In view of each of the various different reasons discussed above, it is respectfully submitted that Claim 1 is not rendered obvious under §103 by Naito. Claim 1 is therefore believed to be allowable, and notice to that effect is respectfully requested.

Dependent Claim 3

Dependent Claim 3 stands rejected under 35 U.S.C. §103 as obvious in view of Naito. This ground of rejection is respectfully traversed. Claim 3 relates to a ratio (R) of the sectional area of a magnet bore to the sectional area of a cell volume, and specifies that this ratio "R is less than 2.85". At the bottom of page 4 of the Office Action, the Examiner proposes a calculation of the ratio of the sectional area of Naito's magnet bore to the sectional area of Naito's cell volume, and concludes that the ratio is 2.78. Applicants respectfully submit that the Examiner's calculation is not correct. More specifically, the Examiner's calculation uses a uniform cell radius of 16.5mm for the ratio calculation. However, due to constrictions in the trapping electrodes, Naito's cell does not actually have a uniform radius of 16.5mm. For example, Naito's cell radius is restricted to 15mm for at least 41mm of its length, and is restricted to 12.5 mm for

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at least 8mm of its length. Using an external radius of 15mm, the ratio of the sectional area of Naito's magnet bore to the sectional area of the cell volume is approximately 3.36. Moreover, due in part to that fact that Naito does not use an external ion source and is thus directed toward a completely different problem than that solved by the present invention, it would not be obvious to modify Naito in a manner that reduces this ratio. The Examiner has not proposed any such modification, and has not demonstrated that there would be motivation to make such a modification. Accordingly, it is respectfully submitted that the subject matter of Claim 3 is not obvious in view of Naito, and notice to that effect is respectfully requested.

Dependent Claims 8 and 9

Dependent Claims 8 and 9 each stand rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from the Naito article and O'Connor U.S. Patent No. 6,720,555. These rejections are each respectfully traversed. Claim 8 recites that:

the axial centre of the measurement cell is arranged away from the geometric centre of the superconducting magnet in the axial direction.

Claim 9 depends from Claim 8, and adds that:

the superconducting magnet has an asymmetric winding so that the magnetic centre in the direction of the longitudinal axis of the magnet bore is different from the geometric centre in that direction.

Claims 8 and 9 thus recognize that the measurement cell may be arranged away from the geometric centre of a superconducting magnet, and Claim 9 recognizes that, in addition, the superconducting magnet may have an asymmetric winding. The Examiner admits on page 6 of

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the Office Action that these characteristics are not disclosed in either Naito or O'Connor, but asserts that they would nevertheless be obvious. Applicants respectfully disagree. In order for Naito's measurement cell to accommodate an external ion source, the configuration of the measurement cell would need to be changed, and the necessary changes would include some significant and non-obvious design problems, such as how to support the cell within the magnet bore, and how to gain access to introduce the necessary electrical connections to the cell. These changes would not be obvious, and it is not at all clear that, after solving these design problems, a person of ordinary skill in the art would end up with an arrangement in which the measurement cell is arranged away from the geometric centre of a superconducting magnet, and/or in which a superconducting magnet has an asymmetric winding.

The Examiner also asserts that the design changes needed in Naito to realize the subject matter of Claims 8 and 9 would be obvious because they involve only "routine skill in the art", or in other words would have been well within the ordinary skill of the art. That is, the Examiner relies on the level of skill in the art to provide the suggestion to modify Naito. However, this approach is directly prohibited by the provisions of MPEP §2143.01, which state that:

FACT THAT THE CLAIMED INVENTION IS WITHIN THE
CAPABILITIES OF ONE OF ORDINARY SKILL IN THE ART
IS NOT SUFFICIENT BY ITSELF TO ESTABLISH *PRIMA*
FACIE OBVIOUSNESS

A statement that modifications of the prior art to meet the claimed invention would have been " well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. [Case citations

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omitted] . . . (The level of skill in the art cannot be relied upon to provide the suggestion to combine references).

Thus, the approach taken in the present Office Action is an approach that is directly prohibited by MPEP §2143.01. In particular, as emphasized in MPEP §2143.01, the level of skill in the art cannot be relied upon to provide the suggestion for modifying teachings of a reference. The present §103 rejection of Claims 8 and 9 is therefore not complete, because it fails to demonstrate the motivation that is required by the MPEP. In effect, the §103 rejection of Claims 8 and 9 is based on hindsight of Applicants' disclosure, rather than on motivation properly derived from what was known prior to the present invention. As discussed above, the use of hindsight of Applicants' disclosure is never proper under §103. Accordingly, it is respectfully submitted that Claims 8 and 9 are not rendered obvious under §103 by Naito and O'Connor, and notice to that effect is respectfully requested.

Dependent Claims 11 and 13

Dependent Claims 11 and 13 each stand rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from Naito and O'Connor. These rejections are each respectfully traversed. Claim 11 recites that:

the measurement cell has a front face defining an opening through which the ions are received from an upstream direction, and wherein the measurement cell is cantilevered or supported from a location in that said upstream direction.

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Claim 13 recites that:

the measurement cell has a front face defining an opening through which the ions are received from an upstream direction, a rear face opposed to the said front face, a plurality of electrodes to generate an electric field across the cell volume, and detector means, the rear face including at least one external electrical contact adapted to engage with at least one of a corresponding power supply contact and/or detector signal processing means.

Naito does not have an external ion source, and O'Connor uses external ionization. For reasons similar to those discussed above in association with Claim 1, it is respectfully submitted that it would not be obvious to modify Naito so as to replace Naito's internal ion source with an external ion source. Moreover, nothing in either of these two documents provides any suggestion to make the proposed modification to Naito. In effect, the §103 rejection of Claims 11 and 13 is based on hindsight of Applicants' disclosure, rather than on motivation properly derived from what was known prior to the present invention. As discussed above, the use of hindsight of Applicants' disclosure is never proper under §103. Accordingly, it is respectfully submitted that Claims 11 and 13 are not rendered obvious under §103 by Naito and O'Connor, and notice to that effect is respectfully requested.

Independent Claim 15

Independent Claim 15 stands rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from Meek U.S. Patent No. 4,686,365, Horning U.S. Patent Application Publication No. 2004/0217272, and the Naito article. However, this ground of rejection is respectfully traversed. As noted earlier, the PTO specifies in MPEP §2142 that:

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The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Meek, Horning and Naito fail to establish a *prima facie* case of obviousness under §103 with respect to Claim 15, for mutually exclusive reasons that are discussed below.

PTO CANNOT ESTABLISH OBVIOUSNESS WITH ART THAT TEACHES AWAY
MPEP §2141.02 specifies that:

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (Emphasis in original).

In the present application, Claim 15 includes a recitation of:

ion guide means arranged between the ion storage device and the measurement cell to guide and focus the ions from the ion storage device into the measurement cell for mass spectrometric analysis therein; . . .

The Examiner asserts that a person of ordinary skill in the art would modify Meek in view of Horning to obtain a mass spectrometer with ion guiding means. However, Meek teaches away from this proposed combination. More specifically, from line 50 in column 2 to line 23 in column 3, and from line 58 in column 5 to line 30 in column 6, Meek teaches that ion guides are

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inferior to electrostatic lenses. Accordingly, since Meek teaches directly away from the proposed modification, it is respectfully submitted that a person skilled in the art would not even remotely consider making this modification to Meek.

Since it is well recognized that teaching away from the claimed invention is a per se demonstration of lack of prima facie obviousness, it is respectfully submitted that Meek, Horning and Naito do not factually support a prima facie case of obviousness with respect to Claim 15. Accordingly, for this independent reason alone, it is respectfully submitted that Claim 15 is not obvious under §103 in view of Meek, Horning and Naito, and notice to that effect is respectfully requested.

IT WOULD NOT BE OBVIOUS TO MODIFY MEEK IN VIEW OF NAITO

Independent Claim 15 further recites that:

the measurement cell extends in the direction of the longitudinal axis of the magnet bore and is generally coaxial therewith, and wherein the superconducting magnet is arranged to generate a magnetic field with field lines that extend in a direction generally parallel with the said longitudinal axis of the magnet bore, and wherein the ratio, R , of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the said longitudinal axis, is less than 4.25.

After suggesting that it would be obvious to modify Meek in view of Horning, the Examiner goes on to admit that even the proposed Meek/Horning combination does not include the dimensional aspects of the measurement cell that are recited in Claim 15. The Examiner therefore asserts that, in view of Naito, a person of ordinary skill in the art would modify the Meek/Horning combination so as to obtain the specific cell dimensions that are recited in Claim 15. However,

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Meek and Horning have external ion sources; whereas Naito has an internal ion source. For reasons similar to those discussed above in association with Claim 1, it is respectfully submitted that it would not be a simple or obvious matter to modify Meek and/or Horning to replace the external ion source of either with an internal ion source, and thus it would not be obvious to redesign the measurement cell of either Meek or Horning, much less in a manner that yields the specific dimensions recited in Claim 15. Accordingly, for this independent reason alone, it is respectfully submitted that Claim 15 is not obvious under §103 in view of Meek, Horning and Naito.

In view of each of the various different reasons discussed above, it is respectfully submitted that Claim 15 is not rendered obvious under §103 by Meek, Horning and/or Naito. Claim 15 is therefore believed to be allowable, and notice to that effect is respectfully requested.

Independent Claim 16

Independent Claim 16 stands rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from Meek and Horning. However, this ground of rejection is respectfully traversed. As discussed earlier, the PTO specifies in MPEP §2142 that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Meek and Horning fail to establish a *prima facie* case of obviousness under §103 with respect to Claim 15, for mutually exclusive reasons that are discussed below.

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PTO CANNOT ESTABLISH OBVIOUSNESS WITH ART THAT TEACHES AWAY

As noted earlier, MPEP §2141.02 specifies that:

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (Emphasis in original).

Claim 16 includes a recitation of:

ion guiding means arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum therein;

The Examiner asserts that a person of ordinary skill in the art would modify Meek in view of Horning to obtain a mass spectrometer with ion guiding means. However, as discussed above in association with Claim 15, Meek teaches away from this proposed combination. In particular, Meek teaches from line 50 in column 2 to line 23 in column 3, and from line 58 in column 5 to line 30 in column 6, that ion guides are inferior to electrostatic lenses. Accordingly, since Meek teaches directly away from the proposed modification, it is respectfully submitted that a person of ordinary skill in the art would not even remotely consider making this modification to Meek. Accordingly, for this independent reason alone, it is respectfully submitted that amended Claim 16 is not obvious under §103 in view of Meek and Horning, and notice to that effect is respectfully requested.

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THE PRIOR ART FAILS TO TEACH ALL OF THE CLAIM LIMITATIONS

The provisions of MPEP §2142 specify with respect to §103 that:

To establish a *prima facie* case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations. (Emphasis added).

The PTO considers this requirement to be important, as evidenced by the fact that this exact language appears not only in MPEP §2142, but also in other sections of the MPEP, including MPEP §706.02(j) and MPEP §2143. Applicants' Claim 16 recites that:

the power supply is configured to supply a potential which accelerates ions from the source or the ion trapping device to a kinetic energy E and to decelerate the said ions at a location only immediately adjacent the front of the measurement cell, and downstream of the front face of the magnet.

The Examiner asserts that Meek discloses decelerating ions at a location only immediately adjacent the front of the measurement cell. However, Figure 7 of Meek is a diagrammatic view that is not to scale, and it is not possible to discern from Figure 7 what size gap Meek actually has between his deceleration lens 86 and his ICR cell 87. Moreover, Meek's specification does not say anything about the size of this gap. A person of ordinary skill in the art who was looking at Meek would not find any suggestion of the benefits of maintaining ions at a high energy all the way through to the measurement cell, and would not find even the merest suggestion of the problem solved by the present invention. Consequently, Applicants submit that Meek does not include anything that specifically and clearly teaches decelerating the ions at a location only immediately adjacent to the front of the measurement cell, nor would the person of ordinary skill

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consider this obvious based on Meek. Accordingly, it is respectfully submitted that Claim 16 is allowable.

In view of each of the various different reasons discussed above, it is respectfully submitted that Claim 16 is not rendered obvious under §103 by Meek and Horning. Claim 16 is therefore believed to be allowable, and notice to that effect is respectfully requested.

Independent Claim 27

Independent Claim 27 stands rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from Meek and Horning. However, this ground of rejection is respectfully traversed. Claim 27 recites:

decelerating the ions at a location only immediately upstream of
the measurement cell, that location being downstream of the front
face of the magnet;

The Examiner asserts that this is disclosed in Meek. However, for reasons similar to those discussed above in association with Claim 16, it is respectfully submitted that Meek does not include anything that specifically and clearly teaches decelerating ions at a location only immediately adjacent to the front of the measurement cell, nor would the skilled person consider this obvious based on Meek. Accordingly, it is respectfully submitted that Claim 27 is allowable, and notice to that effect is respectfully requested.

Dependent Claims

Claims 2, 4-7, 10, 12 and 14, Claims 17-26 and Claims 28-31 respectively depend from Claim 1, Claim 16 and Claim 27, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claims 1, 16 and 27, respectively.

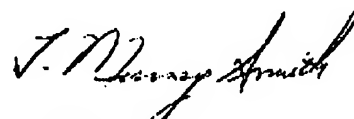
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Conclusion

Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at 972-739-8647.

Respectfully submitted,



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Enclosures: None

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